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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/034,732	12/28/2001	Sudhakar Bobba	03226.156001;P6864	1384

32615 7590 09/09/2004

OSHA & MAY L.L.P./SUN
1221 MCKINNEY, SUITE 2800
HOUSTON, TX 77010

EXAMINER

CHU, CHRIS C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/034,732

Applicant(s)

BOBBA ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 22 - 28 is/are allowed.
- 6) ☒ Claim(s) 1 - 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request for Continued Examination

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 17, 2004 has been entered. An action on the RCE follows.

Response to Amendment

2. Applicant's amendment filed on June 17, 2004 has been received and entered in the case.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the

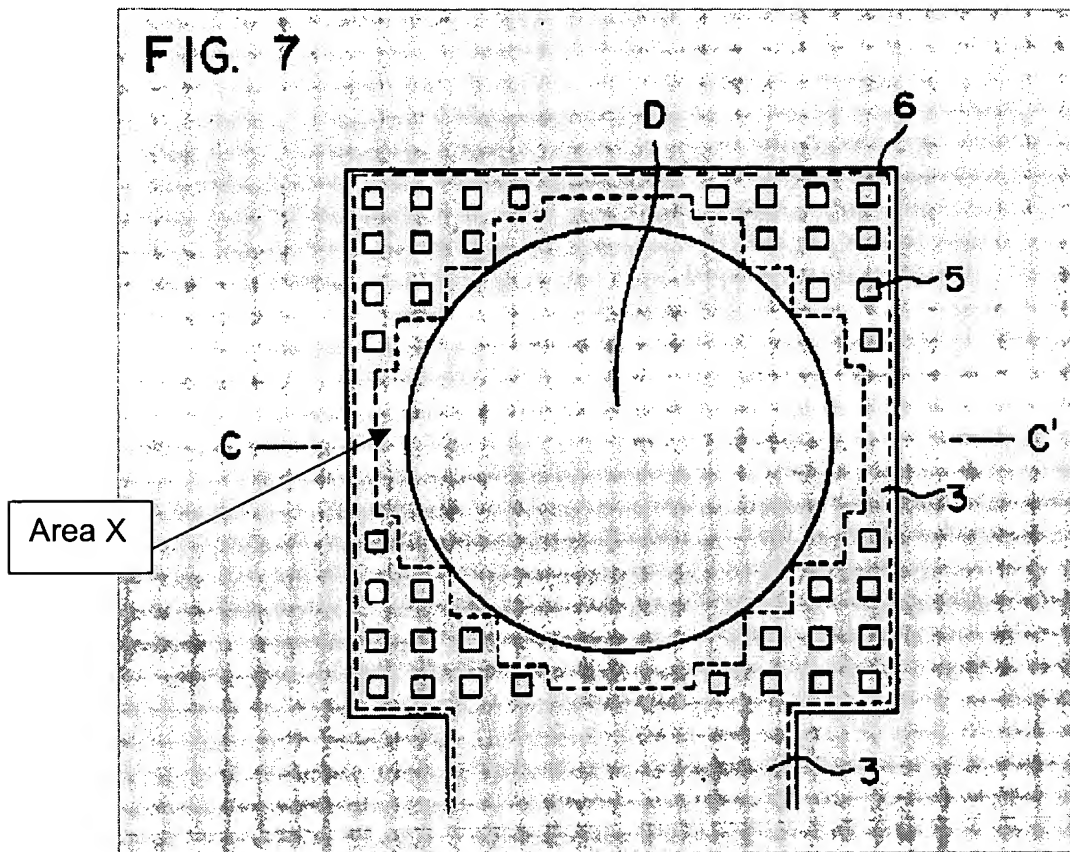
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international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1 – 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujiki et al. '791.

Regarding claim 1, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 a bump and vias structure, comprising:

- a metal layer (6);
- a bump (10 on D) mounted on a landing pad portion (D; column 10, lines 60 - 67) of the metal layer;
- a first plurality of vias (5, at the top-right corner) connected to a first outer region (at the top-right corner where the elements 5 are located) of the metal layer, wherein the first outer region is connected to a first density of vias; and
- a second plurality of vias (5, at the bottom-right corner) connected to a second outer region (at the bottom-right corner where the elements 5 are located) of the metal layer, wherein the second outer region is connected to a second density of vias,
- wherein the first density and second density are greater than a third density of vias connected to a central region (at the middle area where the elements 5 are not located) between the first and second outer regions, and
- wherein an area (at an area X between the dash line and the element D; see next page of this Office action) of the metal layer linearly extending across the metal layer is laterally disposed between the landing pad portion and both the first plurality of vias and the second plurality of vias.



Regarding claims 2, 9 and 16, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 the first density being substantially equal to the second density.

Regarding claims 3, 10 and 17, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 a first current path from the first outer region to the bump being substantially equal to a second current path from the second outer region to the bump.

Regarding claims 4, 11 and 18, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 there being no vias in the central region.

Regarding claims 5, 12 and 19, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 current injection from the first outer region to the bump being greater than current injection from the central region to the bump.

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Regarding claims 6, 13 and 20, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 current injection from the second outer region to the bump being greater than current injection from the central region to the bump.

Regarding claims 7, 14 and 21, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 the central region being positioned further from the bump than the first and second outer regions.

Regarding claim 8, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 an integrated circuit, comprising:

- a metal layer (6);
- a bump (10 on D) mounted on a landing pad portion (D; column 10, lines 60 - 67) of the metal layer;
- a first plurality of vias (5, at the top-right corner) connected to a first outer region (at the top-right corner where the elements 5 are located) of the metal layer, wherein the first outer region is connected to a first density of vias; and
- a second plurality of vias (5, at the bottom-right corner) connected to a second outer region (at the bottom-right corner where the elements 5 are located) of the metal layer, wherein the second outer region is connected to a second density of vias,
- wherein the first density and second density are greater than a third density of vias connected to a central region (at the middle area where the elements 5 are not located) between the first and second outer regions, and
- wherein an area (at an area X between the dash line and the element D) of the metal layer linearly extending across the metal layer is laterally disposed

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between the landing pad portion and both the first plurality of vias and the second plurality of vias.

Regarding claim 15, Fujiki et al. discloses in e.g., Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 a method for reducing current crowding in a bump and vias structure, comprising:

- distributing current (Since the vias 5 are distributed on the first outer region of the metal layer 6, the current is distributed on the first outer region of the metal layer 6 from the distributed vias 5 to the bump 10) from a first outer region (at the top area where the elements 5 are located) of a metal layer (6) to a bump (10 on D) mounted on a landing pad portion (D; column 10, lines 60 - 67) of the metal layer, wherein the first outer region is connected to a first density of vias (5, at the top); and
- distributing current (Since the vias 5 are distributed on the second outer region of the metal layer 6, the current is distributed on the second outer region of the metal layer 6 from the distributed vias 5 to the bump 10) from a second outer region (at the bottom area where the elements 5 are located) of the metal layer to the bump, wherein the second outer region is connected to a second density of vias (5, at the bottom),
- wherein the first density and second density are greater than a third density of vias disposed connected to a central region (at the middle area where the element 5 are not exist) between the first and second outer regions, and
- wherein an area (at an area X between the dash line and the element D) of the metal layer linearly extending across the metal layer is laterally disposed

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between the landing pad portion and both the first density of vias and the second density of vias.

Allowable Subject Matter

5. Claims 22 – 28 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art of record does not teach or reasonably suggest, either singularly or in combination, at least determining a first current path length from a first region to a bump; determining a second current path length from a second region to the bump; selectively disposing a first plurality of vias in the first region at a first density depending on the first current path length; and selectively disposing a second plurality of vias in the second region at a second density depending on the second current path length.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

6. Applicant's arguments filed on June 17, 2004 have been fully considered but they are either moot in light of the new grounds of rejection or are not persuasive.

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On page 11, applicant argues “Fujiki fails to disclose at least the limitations of amended independent claims 1, 8, and 15 of the present application that an area of the metal layer linearly extending across the metal layer is laterally disposed between the landing pad portion and both the first density/plurality of vias and the second density/plurality of vias.” This argument is not persuasive. Fujiki clearly shows in e.g., Fig. 7 an area (at an area X between the dash line and the element D) of the metal layer (6) linearly extending across the metal layer being laterally disposed between the landing pad portion (D; column 10, lines 60 - 67) and both the first density/plurality of vias (5, at the top-right corner) and the second density/plurality of vias (5, at the bottom-right corner).

For the above reasons, the rejection is maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

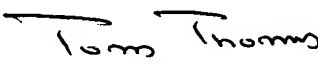
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
Friday, September 03, 2004


TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800